GH-M Rate Monitor
Siemens S7-200 Controller

Part Number: 882.00724.00
Bulletin Number: BF2-600
Effective: 02/08/2007

Write Down Your Serial Numbers Here For Future Reference:

_____ _____

_____ _____

_____ _____

We are committed to a continuing program of product improvement.
Specifications, appearance, and dimensions described in this manual are subject to change without notice.

DCN No. _____
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Shipping Info

Unpacking and Inspection

You should inspect your equipment for possible shipping damage.

Thoroughly check the equipment for any damage that might have occurred in transit, such as broken or loose wiring and components, loose hardware and mounting screws, etc.

In the Event of Shipping Damage

According to the contract terms and conditions of the Carrier, the responsibility of the Shipper ends at the time and place of shipment.

Notify the transportation company's local agent if you discover damage.

Hold the damaged goods and packing material for the examining agent's inspection. **Do not return any goods before the transportation company's inspection and authorization.**

File a claim with the transportation company. Substantiate the claim by referring to the agent's report. A certified copy of our invoice is available upon request. The original Bill of Lading is attached to our original invoice. If the shipment was prepaid, write us for a receipted transportation bill.

Advise customer service regarding your wish for assistance and to obtain an RMA (return material authorization) number.

If the Shipment is Not Complete

Check the packing list as back-ordered items are noted on the packing list. You should have:

- ☑ GH-M Rate Monitor Frame
- ☑ Display Enclosure w/ connecting cable (cable in PLC enclosure on frame)
- ☑ Calibration Weight
- ☑ Weigh Hopper (May be mounted on the frame)
- ☑ Bill of lading
- ☑ Packing list
- ☑ Operating and Installation packet
- ☑ Electrical schematic and panel layout drawings
- ☑ Component instruction manuals (if applicable)

Re-inspect the container and packing material to see if you missed any smaller items during unpacking.

If the Shipment is Not Correct

If the shipment is not what you ordered, **contact the parts and service department immediately** at (847) 273-7700. Have the order number and item number available. *Hold the items until you receive shipping instructions.*

Returns

Do not return any damaged or incorrect items until you receive shipping instructions from the shipping department.

Credit Returns

Prior to the return of any material, **the manufacturer must give authorization.** A RMA number will be assigned for the equipment to be returned.

Reason for requesting the return must be given.

ALL returned material purchased from **the manufacturer** returned is subject to 15% ($75.00 minimum) restocking charge.

ALL returns are to be shipped prepaid.

The invoice number and date or purchase order number and date must be supplied.

No credit will be issued for material that is not within the manufacturer's warranty period and/or in new and unused condition, suitable for resale.

Warranty Returns

Prior to the return of any material, the manufacturer must give authorization**.** A RMA number will be assigned for the equipment to be returned.

Reason for requesting the return must be given.

All returns are to be shipped prepaid.

The invoice number and date or purchase order number and date must be supplied.

After inspecting the material, a replacement or credit will be given at **the manufacturer's** discretion. If the item is found to be defective in materials or workmanship, and it was manufactured by our company**,** purchased components are covered under their specific warranty terms.

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Chapter 1: Safety

1-1 How to Use This Manual

Use this manual as a guide and reference for installing, operating, and maintaining your rate monitor. The purpose is to assist you in applying efficient, proven techniques that enhance equipment productivity.

This manual covers only light corrective maintenance. No other maintenance should be undertaken without first contacting a service engineer.

The Functional Description section outlines models covered, standard features, and safety features. Additional sections within the manual provide instructions for installation, pre-operational procedures, operation, preventive maintenance, and corrective maintenance.

The Installation chapter includes required data for receiving, unpacking, inspecting, and setup of the GH hopper. We can also provide the assistance of a factory-trained technician to help train your operator(s) for a nominal charge. This section includes instructions, checks, and adjustments that should be followed before commencing with operation of the GH Hopper. These instructions are intended to supplement standard shop procedures performed at shift, daily, and weekly intervals.

The Operation chapter includes a description of electrical and mechanical controls, in addition to information for operating the GH Hopper safely and efficiently.

The Maintenance chapter is intended to serve as a source of detailed assembly and disassembly instructions for those areas of the equipment requiring service. Preventive maintenance sections are included to ensure that your GH hopper provides excellent, long service.

The Troubleshooting chapter serves as a guide for identification of most common problems. Potential problems are listed, along with possible causes and related solutions.

The Appendix contains technical specifications, drawings, schematics, parts lists, and available options. Refer to this section for a listing of spare parts for purchase. Have your serial number and model number ready when ordering.

Safety Symbols Used in this Manual

The following safety alert symbols are used to alert you to potential personal injury hazards. Obey all safety messages that follow these symbols to avoid possible injury or death.

DANGER! ***DANGER indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.***

WARNING! ***WARNING indicates a potentially hazardous situation or practice that, if not avoided, could result in death or serious injury.***

Caution! ***CAUTION indicates a potentially hazardous situation or practice that, if not avoided, may result in minor or moderate injury or in property damage.***

Figure 1: Safety Tags and Warning Labels

Tag	Description	Tag	Description
	Pinch Point Slide Gate		Read Operation & Installation Manual
	Shear Point Rotating Mixer		Earth Ground
	High Voltage Inside Enclosure	PE	Protected Earth Ground
	Shear Hazard Rotating Auger		Lifting Point

1-2 Warnings and Precautions

Our equipment is designed to provide safe and reliable operation when installed and operated within design specifications, following national and local safety codes. This may include, but is not limited to OSHA, NEC, CSA, SPI, and any other local, national and international regulations.

To avoid possible personal injury or equipment damage when installing, operating, or maintaining this equipment, use good judgment and follow these safe practices:

- ☑ **Read and follow these operation and installation instructions when installing, operating, and maintaining this equipment. If these instructions become damaged or unreadable, additional copies are available from the manufacturer.**
- ☑ Follow all **SAFETY CODES**.
- ☑ Keep fingers away from slide gates, augers, clean-outs, and calibration hatches. Automatic operation may start unexpectedly, **A PINCH HAZARD CAPABLE OF CAUSING BODILY INJURY EXISTS ANY TIME THE POWER IS ON.**
- ☑ Wear **SAFETY GLASSES** and **WORK GLOVES**.
- ☑ Work only with approved tools and devices.
- ☑ Disconnect and/or lock out power and compressed air before servicing or maintaining the equipment.
- ☑ Use care when **LOADING**, **UNLOADING**, **RIGGING**, or **MOVING** this equipment.
- ☑ Operate this equipment within design specifications.
- ☑ **OPEN**, **TAG**, and **LOCK ALL DISCONNECTS** before working on equipment. You should remove the fuses and carry them with you.
- ☑ **NEVER PUT FINGERS OR TOOLS IN AN AUGER OR SLIDE GATE AREA.**
- ☑ Make sure the equipment and components are properly **GROUNDED** before you switch on power.
- ☑ Do not restore power until you remove all tools, test equipment, etc., and the equipment and related components are fully reassembled.
- ☑ Only **PROPERLY TRAINED** personnel familiar with the information in this manual should work on this equipment.

We have long recognized the importance of safety and have designed and manufactured our equipment with operator safety as a prime consideration. We expect you, as a user, to abide by the foregoing recommendations in order to make operator safety a reality.

1-3 Responsibility

These machines are constructed for maximum operator safety when used under standard operating conditions and when recommended instructions are followed in the maintenance and operation of the machine.

All personnel engaged in the use of the machine should become familiar with its operation as described in this manual.

Proper operation of the machine promotes safety for the operator and all workers in its vicinity.

Becoming familiar with materials, inspection, speed limitations, screens, and guard maintenance and total user responsibility will assist you in learning potential areas in need of observation for danger.

Each individual must take responsibility for observing the prescribed safety rules as outlined. All caution, warning and danger signs must be observed and obeyed. All actual or potential danger areas must be reported to your immediate supervisor.

General Responsibility

No matter whom you are, safety is important. Owners, operators and maintenance personnel must realize that every day, safety is a vital part of their jobs.

If your main concern is loss of productivity, remember that production is always affected in a negative way following an accident. The following are some of the ways that accidents can affect your production:

- Loss of a skilled operator (temporarily or permanently)
- Breakdown of shop morale
- Costly damage to equipment
- Downtime

An effective safety program is responsible and economically sound.

Organize a safety committee or group, and hold regular meetings. Promote this group from the management level. Through this group, the safety program can be continually reviewed, maintained, and improved. Keep minutes or a record of the meetings.

Hold daily equipment inspections in addition to regular maintenance checks. You will keep your equipment safe for production and exhibit your commitment to safety.

Please read and use this manual as a guide to equipment safety. This manual contains safety warnings throughout, specific to each function and point of operation.

Operator Responsibility

The operator’s responsibility does not end with efficient production. The operator usually has the most daily contact with the equipment and intimately knows its capabilities and limitations.

Plant and personnel safety is sometimes forgotten in the desire to meet incentive rates, or through a casual attitude toward machinery formed over a period of months or years. Your employer probably has established a set of safety rules in your workplace. Those rules, this manual, or any other safety information will not keep you from being injured while operating your equipment.

Learn and always use safe operation. Cooperate with co-workers to promote safe practices. Immediately report any potentially dangerous situation to your supervisor or appropriate person.

REMEMBER:

- **NEVER** place your hands or any part of your body in any dangerous location.
- **NEVER** operate, service, or adjust the rate monitor without appropriate training and first reading and understanding this manual.
- **NEVER** try to pull material out of the rate monitor with your hands while it is running!

Before you start the GH Hopper check the following:

- Remove all tools from the unit;
- Be sure no objects (tools, nuts, bolts, clamps, bars) are laying in the feeding area.

Note: If your rate monitor has been inoperative or unattended, check all settings before starting the unit.

Note: At the beginning of your shift and after breaks, verify that the controls and other auxiliary equipment are functioning properly.

Note: Keep all safety guards in place and in good repair. NEVER attempt to bypass, modify, or remove safety guards. Such alteration is not only unsafe, but will void the warranty on your equipment.

Note: When changing control settings to perform a different mode of operation, be sure selector switches are correctly positioned. Locking selector switches should only be adjusted by authorized personnel and the keys removed after setting.

Report the following occurrences **IMMEDIATELY:**

- Unsafe operation or condition
- Unusual action
- Leakage
- Improper maintenance

Note: NEVER stand or sit where you could slip or stumble into the rate monitor while working on it.

Note: DO NOT wear loose clothing or jewelry, which can be caught while working on a rate monitor. In addition, cover or tie back long hair.

Note: Clean the rate monitor and surrounding area DAILY, and inspect the machine for loose, missing or broken parts.

Note: Shut off power to the GH Hopper when it is not in use. Turn the switch to the OFF position, or unplug it from the power source.

Maintenance Responsibility

Proper maintenance is essential to safety. If you are a maintenance worker, you must make safety a priority to effectively repair and maintain equipment.

Before removing, adjusting, or replacing parts on a machine, remember to turn off all electric supplies and all accessory equipment at the machine, and disconnect and lockout electrical power. Attach warning tags to the disconnect switch.

When you need to perform maintenance or repair work on a rate monitor above floor level, use a solid platform or a hydraulic elevator. If there is a permanently installed catwalk around your rate monitor, use it. The work platform should have secure footing and a place for tools and parts. **DO NOT** climb on unit, machines, or work from ladders.

If you need to repair a large component, use appropriate handling equipment. Before you use handling equipment (portable "A" frames, electric boom trucks, fork trucks, overhead cranes) be sure the load does not exceed the capacity of the handling equipment or cause it to become unstable.

Carefully test the condition of lifting cables, chains, ropes, slings, and hooks before using them to lift a load.

Be sure that all non-current carrying parts are correctly connected to earth ground with an electrical conductor that complies with current codes. Install in accordance with national and local codes.

When you have completed the repair or maintenance procedure, check your work and remove your tools, rigging, and handling equipment.

Do not restore power to the rate monitor until all persons are clear of the area. **DO NOT** start and run the unit until you are sure all parts are functioning correctly.

BEFORE you turn the rate monitor over to the operator for production, verify all enclosure panels, guards and safety devices are in place and functioning properly.

Reporting a Safety Defect

If you believe that your equipment has a defect that could cause injury, you should immediately discontinue its use and inform the manufacturer.

The principle factors that can result in injury are failure to follow proper operating procedures (i.e. lockout/tagout), or failure to maintain a clean and safe working environment.

Chapter 2: Functional Description

2-1 Models Covered in This Manual

This manual provides operation, installation, and maintenance instructions for rate monitors of various extrusion rates and specifications. See below for a list of available models.

- GH-M-10 Rate Monitor (50-600 pounds/hour) with Siemens S7-200 Controls
- GH-M-20 Rate Monitor (300-1,500 pounds/hour) with Siemens S7-200 Controls
- GH-M-40 Rate Monitor (1,000-2,500pounds/hour) with Siemens S7-200 Controls

Model numbers are listed on the serial tag. Make sure you know the model and serial number of your equipment before contacting the manufacturer for parts or service.

Rate monitoring systems are as varied as the applications they service. All gravimetric rate monitors are sized to meet the specific requirements stated by the Customer at the time of purchase.

2-2 General Description

Rate monitors are designed to measure the extrusion rate of plastic pellets and regrind. Standard equipment is not designed to measure powder or any other materials. Optional equipment may be purchased to measure the extrusion rate of powders.

Accessories

The manufacturer offers a variety of standard options for GH-M rate monitors including knife gates, low-level proximity switches, Profibus DP Slave communication modules, and hoppers specifically designed to measure the extrusion rate of powders. All accessories are designed and manufactured to ensure proper results for your application.

Customer Service

The intent of this manual is to familiarize the operator and maintenance personnel with these rate monitors and help your organization get the maximum service from your equipment. If you have any questions regarding installation, service, repair, custom equipment, or applications, please do not hesitate to contact us for the information required. Prices for additional equipment, accessories, or repair parts will be furnished promptly upon request.

Note: If you desire to use a rate monitor for an application other than that for which it was purchased, please contact your sales representative or our factory to verify compatibility of the equipment with the new process. Misapplication of the equipment could result in injury to the operator or damage to the equipment.

Figure 2: Equipment Specifications

Model		10	20	40
Maximum Extrusion Rate, lbs/hr (kg/hr)		600 (272)	1200 (680)	2500 (1134)
Weigh Hopper Capacity, cu.ft. (Liters)		0.35 (10)	0.7 (20)	1.41 (40)
Typical Weigh Hopper Size, lbs.		10	20	40
Load Cell Capacity, kgs		1 @ 10 kg	1 @ 20 kg	1 @ 30 kg
Approximate Dimensions, in. (mm)	Height (5)	34.5 (875)	51.5 (1308)	56.5 (1435)
	Width (5)	26.0 (650)	37.5 (952)	37.0 (940)
	Depth (5)	22.0 (560)	37.0 (940)	40.0 (1016)

2-3 Typical Features and Components

Mechanical Features

- Removable stainless steel weigh hoppers.
- Stainless steel surge (supper supply) hopper with integral air cylinder and urethane dump cone.
- Precision 1/10% span accurate cantilever load cell weighing system
- Inductive extruder tracking proximity switch.
- Rugged industrial mild steel painted frame.
- Cast aluminum spool with drain and purge ports.

Figure 4: Typical GH Siemens S7-200 PLC Enclosure

Controller Features

- LCD touch-screen interface display operator control panel with 8’ cable
- Siemens S7-200 CPU 226 PLC
- Thermocouple Input card for loadcell
- Manual key switch control function for reload
- Visual Alarm
- Full control diagnostics
- Profibus DP Slave Module

System Component Description

This section describes the various components of the rate monitor system.

Extruder Inductive Proximity Switch

The extruders RPM must be reported to the GH-M controller for the system to function. To accomplish this, an inductive proximity switch is provided to let the GH-M controller know the RPM of the extruder. This switch should be field mounted in an appropriate way to read the extruder's true RPM. It is important this switch is reading the actual RPM of the Extruder, and not an RPM before a gearbox, for example. Chapter 3 will detail the installation and wiring of this component. Because it is field mounted, wiring of the proximity switch will NOT be done at the factory and we do not provide any custom mounting brackets for your application as these vary depending on the equipment.

This measurement can also be achieved by writing the extruder's rpm through communications (see document at the end of this manual for details). If this is done through communications then it eliminates the need to install the extruder proximity switch.

Surge Hopper

The surge hopper is located on top of the GH-M frame. These hoppers store a supply of material to fill the weigh hopper. The surge hopper is sized based on the total throughput of the extrusion rate monitoring system. Each surge hopper contains a 24V DC solenoid that is used to open and close the internal dump cone. The internal urethane dump cone is mechanically opened and closed with a compressed air cylinder.

The rate monitor's surge hopper does not include any level indication devices as standard equipment. Optional surge hopper low-level sensors are available. The rate monitor controller will alarm if it runs out of material while trying to fill the weigh hopper, but low-level sensors will alert floor personnel to the problem sooner. If an optional low-level sensor is purchased, it will activate a visual alarm. This optional proximity switch can be mounted anywhere the customer desires and is not mounted unless specifically requested.

The refill system is equipped with a manual key switch to open and close the surge hopper. This three position key switch is located on the front of the PLC enclosure.

Figure 5: Typical Surge Hopper

Figure 6 Refill Switch Positions

Position	Description
AUTO	The rate monitor controller automatically controls surge hopper functions.
OPEN	Dump cone gate open all the time
CLOSE	Dump cone closed all the time

Each surge hopper is supplied with a lid. Standard lids contain a cutout to accept a vacuum receiver. A blank lid may also be provided if specified.

If the rate monitor is being refilled from a mezzanine-mounted GH Hopper, the surge hopper lid will have a tube stub on it.

The surge hopper will be mounted on the frame at the factory. The 24V dc solenoid will also be factory wired. In some rare cases, it may be necessary to remove the surge hopper for shipping purposes

Weigh Hopper

The weigh hopper is located within the GH-M frame. The hopper size is set within the controls. Default for refilling to occur is 50% of the weigh hopper size.

The weigh hopper on the rate monitor is used to weigh the material entering the extrusion process. Once the weigh hopper goes below 50% of its set weight capacity the solenoid valve on the surge hopper will open, allowing material to fall from the surge hopper to the weigh hopper. The surge hopper solenoid will close once the weigh hopper reaches its set weight capacity.

Details for installing and removing the weigh hopper are included in the next section. The weigh hopper will need to be installed before operation can begin. It is necessary to remove the weigh hopper for shipment, so the loadcell is not damaged.

When the weigh hopper is installed use care not to damage the load cell. Position the hopper

Note: Use care when replacing the weigh hopper, since the load cells are delicate weighing instruments and can be easily damaged. Do not use force to push in the weigh hopper.

Note: Load cells, if damaged, will have to be sent back to the manufacturer for testing and evaluation.

Note: Make sure no part of the load cell bracket is touching the plastic housing on the load cell. This could result in inaccurate weight readings. If necessary the plastic on the loadcell can be trimmed back

tube stub as close to the center of the hole in the bottom of the frame as possible.

Operator Control Panel Display

The operator control panel includes an 8-foot (2.4 m) cable and can be remote mounted (not recommended) adjacent to the GH Hopper. The panel can be unplugged and removed if necessary. The cable provides 24VDC power to the display, as well as communications to the PLC.

A programmable logic controller (PLC) controls the rate monitor operation. This design provides excellent performance along with an easily replaceable control panel in the unlikely failure of any computer or electronic part.

After installation and setup, the GH-M will begin monitoring the system process once the rate monitor detects an extruder speed.

The following figures show some typical screens of the GH-M rate monitor.

Figure 8: Typical Siemens S7-200 Controller Touch Screen Display

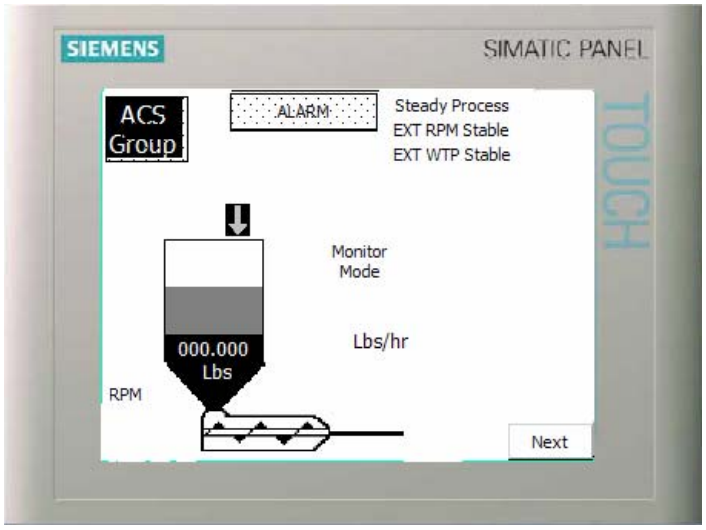


Figure 9: Controller Pushbuttons & Touchscreen Tags

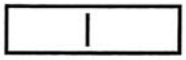
Button	***Function***
 (Power On)	Turns power on to the GH Hopper controller. (Found on the back of the controller.)
(Power Off)	Turns power off to the GH Hopper controller. (Found on the back of the controller.)
	Stops GH Hopper & restarts controller.
	Press to move back one screen level in controller function.
	Move forward one screen level in controller function.

Figure 10: Typical Operator Screens

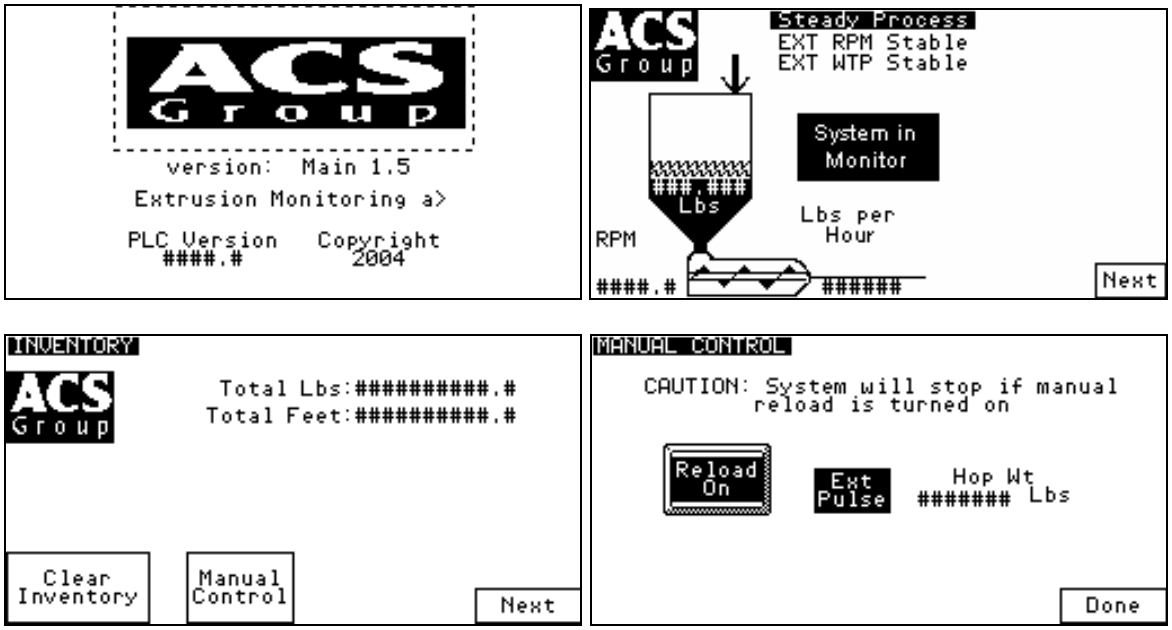
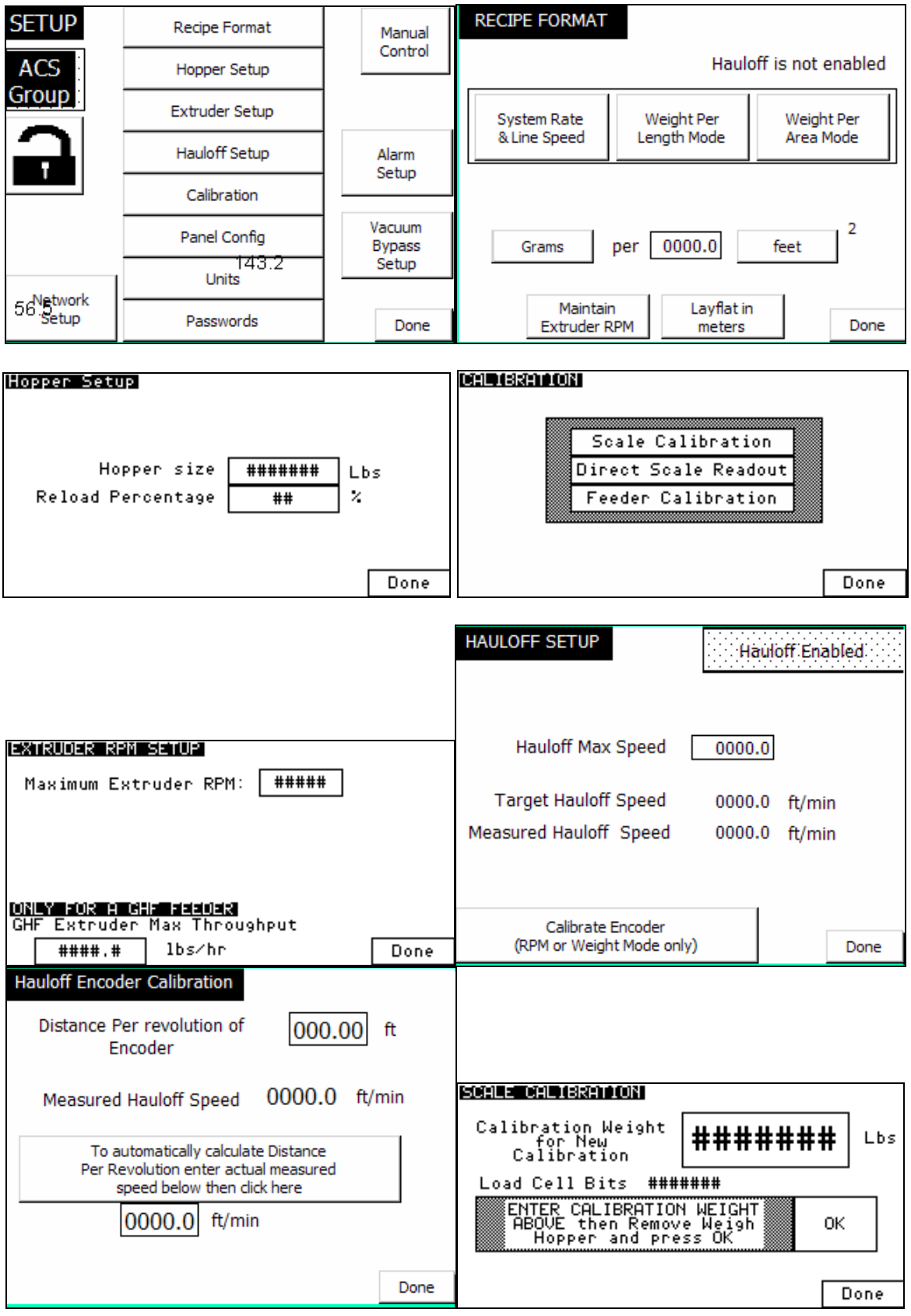
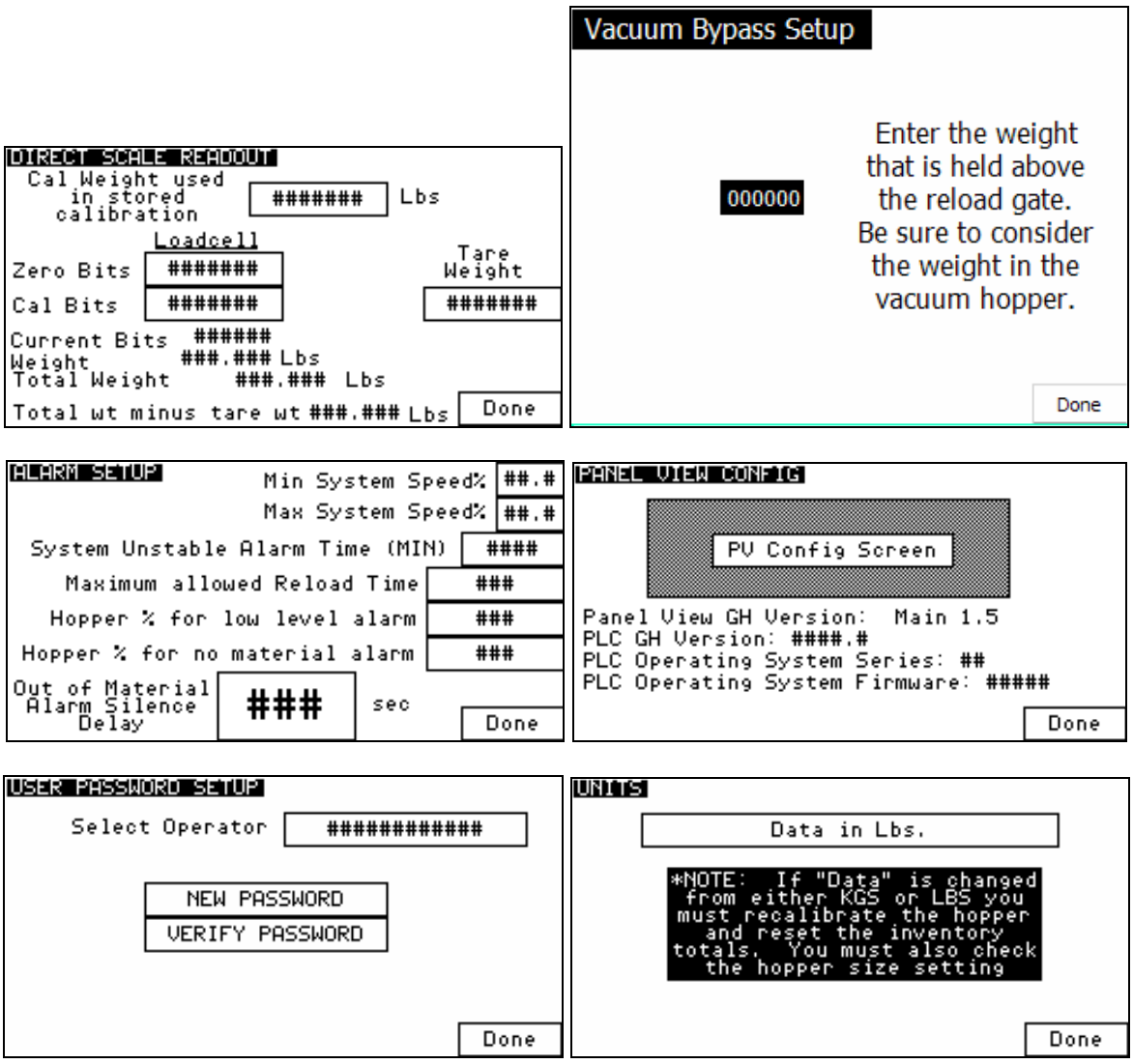


Figure 11: Typical Setup Screens





2-4 Optional Components

The following is a list of options, which your rate monitor may have been equipped with:

Profibus DP Slave

In lieu of an inductive proximity switch, the extruder's RPM may be written through communications. To accomplish this you need to write the speed through from a Profibus DP Master as mentioned at the end of this manual

Pneumatic Slide Gate below surge hopper

The surge hopper can be equipped with a pneumatic slide gate in lieu of the air cylinder and urethane dump cone. The knife gate is opened and closed by the PLC. A 24 VDC solenoid is used to open and close the knife gate.

WARNING! Slide gates create a pinch-point hazard

Low Level Proximity Sensors

Detects material supply problems before rate monitor hoppers are empty. A 24VDC capacitive proximity switch is utilized for this option. The proximity switch is wired directly into the PLC enclosure. If there is a material supply problem, a visual alarm is activated.

2-5 Safety Features

This section includes information on safety devices and procedures that are inherent to the rate monitor system. This manual is not intended to supersede or alter safety standards established by the user of this equipment. Instead, the material contained in this section is recommended to supplement these procedures in order to provide a safer working environment.

Chapter 3: Installation

3-1 Uncrating the Equipment

Rate monitors are shipped mounted on a skid, enclosed in a plastic wrapper, and contained in a crate.

1. Remove crate from around the rate monitor.
2. Secure strap of proper lifting capacity.

Caution! ***Use approved safety straps or chains to lift the rate monitor.***

3. Lift the rate monitor until strap is taut.
4. Remove bolts attaching bottom of the rate monitor to shipping skid.

3-2 Mechanical Installation

It is the intent of this section to familiarize the reader with the proper site requirements and installation procedures of the GH-M rate monitoring system. The information in this section is NOT meant to replace or supersede an established local or company implemented procedures. It is meant to enhance them.

The installation procedure should be used as a general guideline for the proper installation steps required to install a rate monitoring system.

1. Lift the rate monitor and position over machine throat.
2. Set in position and secure by tightening four bolts.
3. Remove lifting strap.
4. Mount the material conveying system receivers on the top of the rate monitor's surge hopper. If a mezzanine mounted GH Hopper is being used to supply material to the rate monitor, attach the flex hose to the top of the surge hopper.
5. Install the weigh hopper onto the load cell bracket. Tighten the two supplied thumb screws to the flange on the weigh hopper.

   Note: Use extreme care when tightening bolts on top of the load cells so you do not spring the load cells. The load cells are extremely delicate and should be treated with care!

6. Check to see that the weigh hopper is completely unrestricted. The load cell bracket should not touch any part of the plastic housing on the load cell. The tube stub on the bottom of the weigh hopper should not touch any part of the cast spool. If either of these conditions are not met, inaccurate weight readings may result.

Site Requirements

This section describes site requirements in detail. These requirements are broken down into mechanical mounting, electrical connections and pneumatic connections.

Mounting Configurations

The rate monitoring system must be machine mounted.

Machine Mount

The GH-M rate monitor must be machine mounted. There are a few items to review ***before*** placement and mounting of the rate monitor system begins.

First, verify the machine flange dimensions match the cast spool-mounting flange.

Verify that the machine throat is physically capable of supporting the rate monitoring system with a full load of material and vacuum loading equipment installed.

> **Note: While in operation, the rate monitoring system applies horizontal and vertical pressures to the mounting flange. If there is a question as to the mechanical stability of a mounting flange, contact the manufacturer's engineering department.**

Verify all clearances on the top and beside the processing machine. This is to insure that all motors, hoppers, control panels, etc. have adequate room for proper operation and servicing.

Refer to the assembly drawing with the unit for actual height and width dimensions.

> **Note: Allow at least 36" clearance around the rate monitor to provide adequate room for cleaning, servicing, etc.**

Using proper lifting equipment, lift the rate monitor. Affix the rate monitor to the processing machine.

> **Note: Larger rate monitors may need to be braced as part of the installation.**

Take care to insure proper orientation with adequate access to operator controls, mix chamber, and metering units.

> **Note: Never weld on the rate monitor, support stand, machine or mezzanine without first removing the control panel and verifying that the rate monitor is properly grounded.**

3-3 Electrical Connections

The standard rate monitor system is designed to operate on 120/1/60 or 220/1/60 supply voltage. For exact current requirements, check the GH Hopper serial number tag, located on the right side of the PLC enclosure.

If a step down transformer was provided, it should never be used to power anything other than the rate monitor. Loading equipment, etc. must be powered by another power source. As well as possibly overloading the transformer, the additional equipment may induce power line noise that may affect the operation of the rate monitor

The transformer will be mounted and wired by the customer or your installer. If company or local codes require fusing or disconnects, these items must be supplied, wired, and mounted by the customer.

> **Note: Each rate monitor MUST be connected to a separate source of power. Do not connect other electrical equipment, especially self-contained hopper loaders, on the same line as the rate monitor.**

Ensure that the power entrance location on the rate monitor panel remains unchanged. Make sure that the proper size wire and proper wire routing techniques are used when installing the

supply wiring to the control panel. Care must be taken to ensure that the supply wiring does not interfere with the low voltage DC wiring.

The rate monitor is supplied with a plug that functions as the disconnect device. The mating receptacle must be installed no higher than 5’ feet (1.6 m) above the floor. Make sure your installation conforms to your regional electrical standards.

Please refer to the supplied electrical schematics for detailed connection points for the supply power.

3-4 Pneumatic Connections

The rate monitoring system uses plant-supplied compressed air to operate the surge hopper.

CLEAN AND DRY air must be supplied to the rate monitor. The air supply should be filtered through a 5 micron air filter with a water separator. Oil should not be used unless air dryers are installed on the compressed air supply. In this situation, an oiler may be required on the rate monitor to keep the air cylinder seals lubricated.

Usage is about 5 cu. inches per refill.

A single 1/8” NPT standard pipe thread fitting is provide on the surge hopper solenoid to supply air.

Caution! ***To prevent damage to the equipment, do not exceed 60 psi (4.14 bar) air pressure.***

Caution! ***Always disconnect the compressed air supply when working on any part of the rate monitor.***

3-5 Initial Set-up

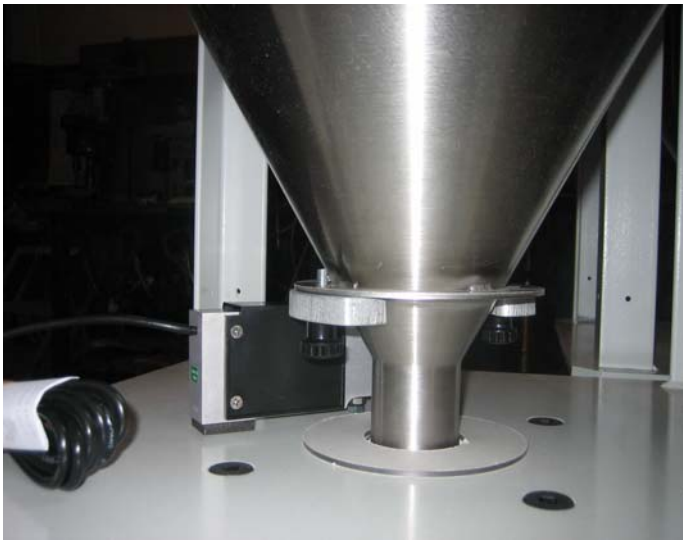
This section will discuss the mechanical setup and control system setup of the rate monitor system. After reading this section, you should be familiar with the mechanical setup and the electronic control setup of the rate monitor.

Mechanical Set-up

Weigh Hopper Installation

It is necessary to install the weigh hopper. Remove the weigh hopper from the shipping box and install it onto the load cell bracket. Two provided thumbscrews are used to secure the weigh hopper to the load cell bracket.

Figure 12: Picture of Weigh Hopper



Note: THE WEIGH HOPPER ASSEMBLY MUST HANG FREELY AND BE FREE FROM FRICTION, WITH NO MECHANICAL OBSTRUCTIONS OTHER THAN THE LOAD CELL ITSELF.

It is very important the tube stub of the weigh hopper does not touch the supplied dust ring. It is also important the flange of the weigh hopper be completely flush with the load cell bracket.

Extruder RPM connection

The supplied inductive proximity switch must be mounted to accurately read the Extruder's RPM. The extruder's speed may be reported to the controller via communications (see communications section at the end of this manual).

The proximity switch must be mounted securely, and read the actual RPM of the extruder. Supplementary documentation on this proximity switch is provided from its manufacturer.

To wire the supplied inductive proximity switch the PLC enclosure, please refer to the supplied wiring schematics.

If you are writing the extruder speed through Profibus then the proper setting has to be changed to measure the extruder's RPM with communications. For details on changing the settings for measuring the extruder's RPM, please refer to the Addendum 7-4.

Final Connections

Connect the rate monitor to the appropriate power source.

Connect the compressed air piping, ensuring that a 5-micron air filter is installed, along with the proper water trap. Verify that 60-psi of clean, dry compressed air is supplied to the GH Hopper.

After powering up the rate monitor, the following screen will be shown:

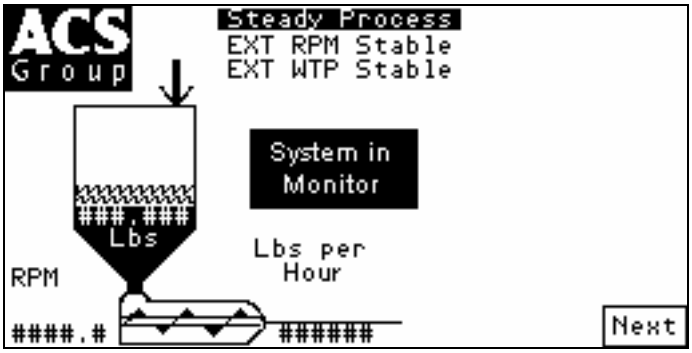
Figure 13: Display Startup Screen

Touch here to skip quickly to the Recipe Screen (Next Screen in sequence).
ACS Group
version: Main 1.5
Extrusion Monitoring a>
PLC Version ####.#
Copyright 2004

Note: It may take 45-50 seconds for the screen to appear.

This screen displays the software version of both the PLC and the PanelView. The Controller will stay on this screen for about 10 seconds or you can touch the ACS icon to quickly skip to the Recipe Screen (Next Screen in sequence). The software versions are also available on the Panel View Configuration Screen.

Figure 14: Display Main (Recipe) Screen



To access the Setup Menu to change the controller features, refer to the following pages of this manual.

Controller Set-up

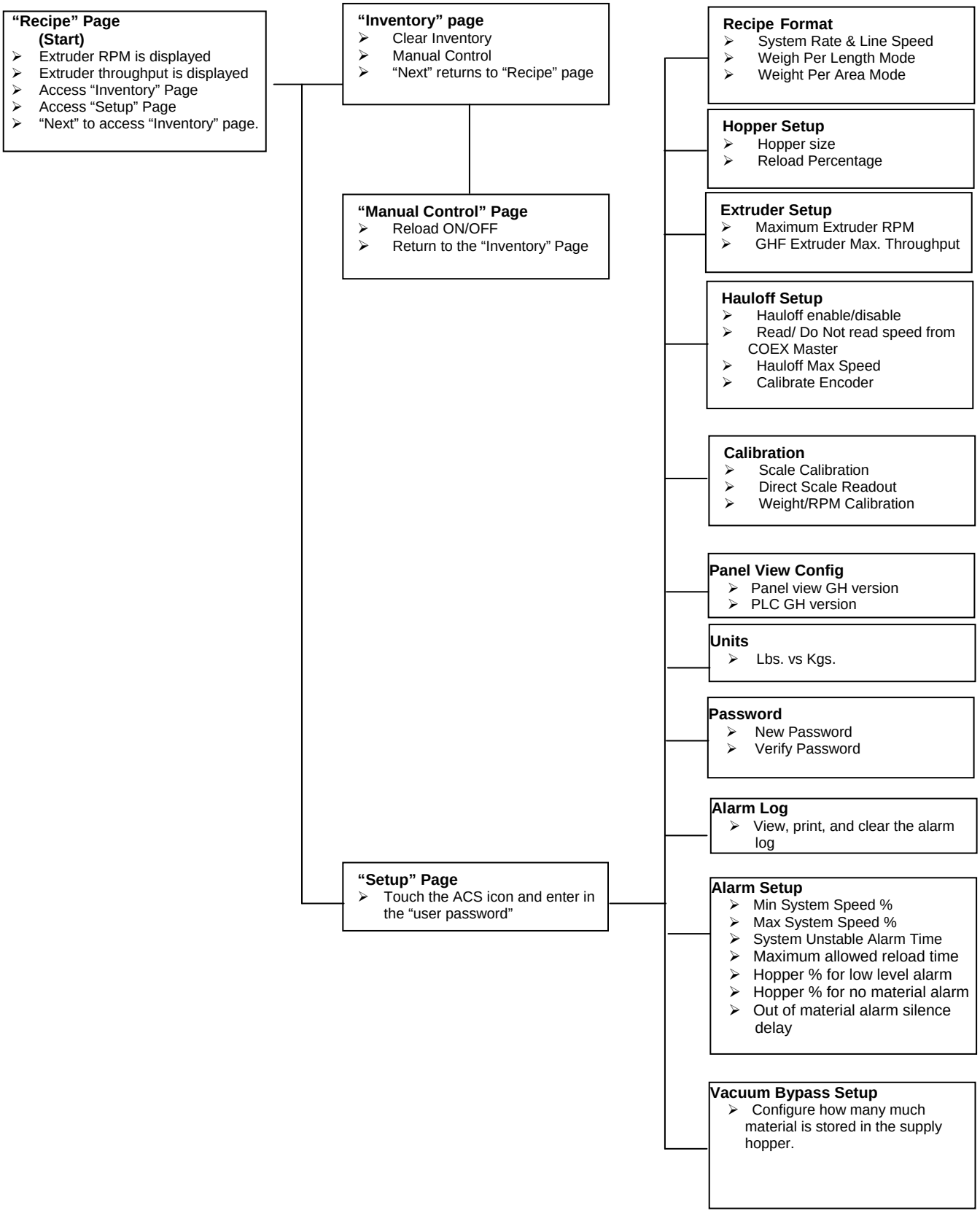
This section describes the proper setup of the rate monitoring system control parameters. These parameters are operator changeable; however, these items should only require setup

during the initial installation. Only authorized personnel should change them. For security reasons, the menu that is used to access these parameters is password protected.

Many of the variables and setup parameters have been preset at the factory and do not need to be changed. However, this section of the manual will address all of the rate monitor setup parameters that were available at the time of printing. The purpose of this is to familiarize the reader with all the setup parameters and their usage.

A complete listing of all default values is provided at the end of this manual.

GH Controller Menu Structure



Rate Monitor Calibration

The load cell on a rate monitor is FACTORY CALIBRATED. Since the load cell can be subject to shock loading during shipping, moving, etc., we recommend that they be recalibrated.

The heart of the rate monitor system is the **load cell** and the supplied calibration weight. Since the load cell is weighing the amount of material entering the process, **proper calibration of the load cell is essential for the correct and accurate operation of the rate monitor**. This calibration must be performed upon initial installation and startup. **The calibration should also be checked once a month with a calibration weight and if necessary recalibrated to ensure that it has not been damaged in the normal routine of removing and replacing the weigh hopper for cleaning.**

The calibration of the load cell is accomplished by using two reference points on the output of the load cell scale. The first of these points is known as the "Tare Weight". This is the weight of the empty weigh hopper assembly on the load cell. This is also known as the zero weight point (starting point) of the scale. This zero or starting point must be initialized with an empty weigh hopper. There must be no binding or leverage put on the load cell.

The second weight point used in the load cell calibration procedure is a known amount of weight for the weigh hopper. A calibration weight is provided with all rate monitors. The calibration weight is stamped with its actual weight on top. If this is not available, any object with a known weight accurate to the nearest 1/1000th of a pound, in the 2 - 10 lb. range, proportional to your size rate monitor, will suffice. (The weight should be as close as possible to the weigh hopper's capacity.) The weight will be in pounds, unless the rate monitor is provided for metric operation. In the case of a metric display, the weight to be used is calibrated in kilograms.

Given the two weight points on the load cell scale, the controller should determine any other weight on the load cell span. This is limited to the maximum capacity of the load cell. The standard load cell used on rate monitors has a span accuracy of $^{1}/_{10}$%.

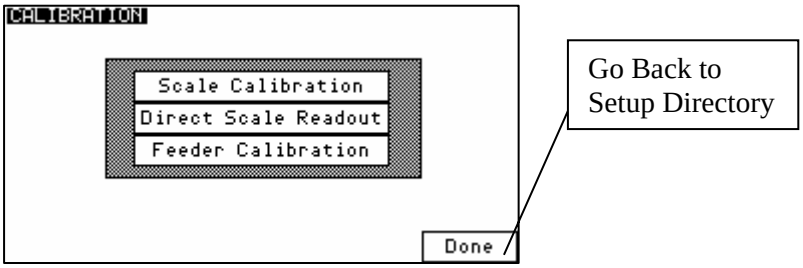
The maximum capacity of each load cell is clearly marked on top of the load cell. This value will be indicated in kilograms (1 kg = 2.2 lbs.).

> **Note: It is not necessary to calibrate the weight scale on a brand new rate monitor, although it is recommended that the calibration be checked periodically to ensure that the reported inventory totals are accurate.**

Weigh Hopper (Load Cell) Calibration

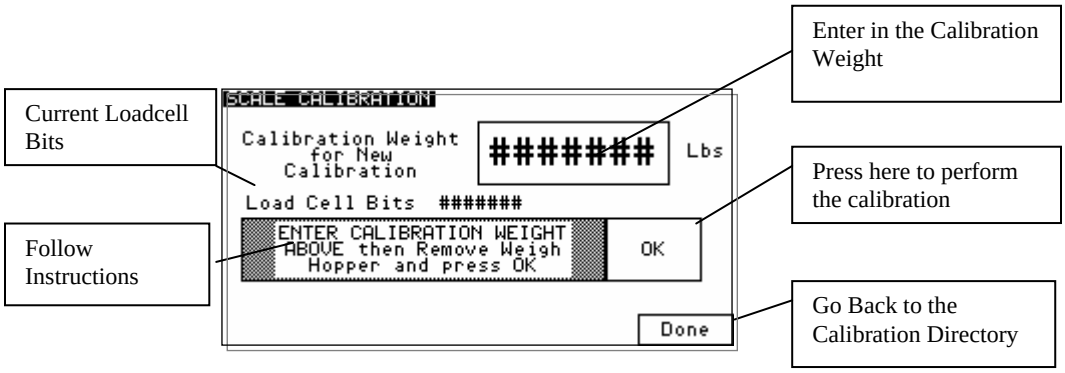
1. From the "Recipe" Page, touch the Manufacturer's icon and enter "5413", then press the "Enter˝ key.
2. Touch "Calibration" and then "Scale Calibration".

Figure 15: Display Calibration Menu Screen



3. Once in “Scale Calibration”, enter in the scale calibration weight value stamped on the side of the weight.
4. The controller will prompt you to empty the weigh hopper and press “OK”.
5. After touching OK, the controller will display “PLEASE WAIT...”
6. Next, the controller will ask you to hang the calibration weight on the weight hopper and press OK.
7. Finally, the controller will ask you to remove the calibration weight and press “OK” to complete the calibration.
8. The controller will verify that the calibration was done correctly by showing “Calibration Successful.”
9. Press “Done” until you have reached the Recipe screen.

Figure 16: Display Calibration Screen



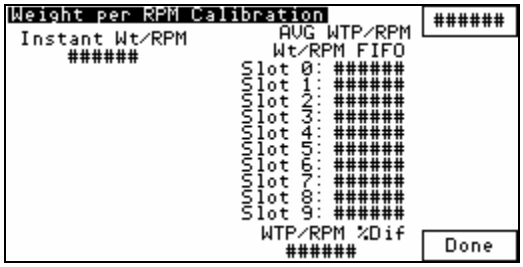
Verifying Calibration (Recommended on a periodic basis to ensure accuracy)

1. From the “Recipe” Page, touch the Manufacturer’s icon and enter “5413”, then press the “Enter” key.
2. Touch “Calibration” and then “Direct Scale Readout”
3. Ensure the weigh hopper is empty.
4. Locate the weight display for the load cell directly below “Current Bits.” Write down the displayed value.

5. Add the calibration weight to the weigh hopper and write down the value displayed in “weight”, as in step 4.
6. Subtract the values recorded in step 4 from step 5. This is the measured weight. If the measured weight is within a 0.003 pounds of the weight stamped on the calibration weight, then you are within spec. If not, follow the steps above to calibrate the rate monitor. (If your rate monitor is frequently out of calibration, verify the operator is being cautious removing the weigh hopper.)
7. Press “Done” until you have reached the Recipe screen.
8. ***Anything in the Diagnostics Menu that is not covered here is in the Detailed Controller Setup Section***

WTP/RPM Calibration Page

This page is used to monitor the lbs/hr per RPM analyzer and is used as a tool for tuning the WTP Algorithm Options mentioned later in this book.

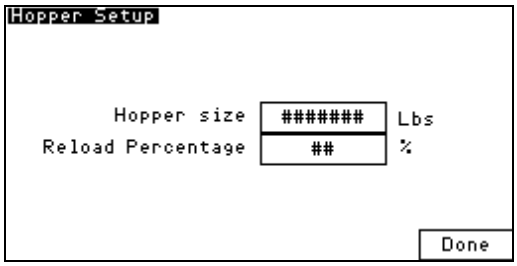


Hopper Size Setup

The weigh hopper size is factory set. In may be necessary, however, to change this value due to varying bulk densities of material.

1. Enter the Setup Menu.
2. Select “Hopper Setup”
3. Enter the required size for the weigh hopper (should be close to full)
4. Set the refill percentage to 50%.
5. Press done to return the setup menu.

Figure 17: Hopper Setup

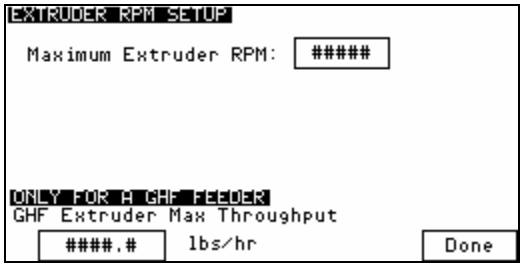


Extruder Setup

Use this page to setup the Maximum Extruder RPM. This is critical for GH Monitor units and GHF feeder units. This value is automatically calculated with GH Full Control units.

Also for GHF Feeder units you will need to program in the maximum LBS/HR of the extruder for the feeder's target LBS/HR calculation.

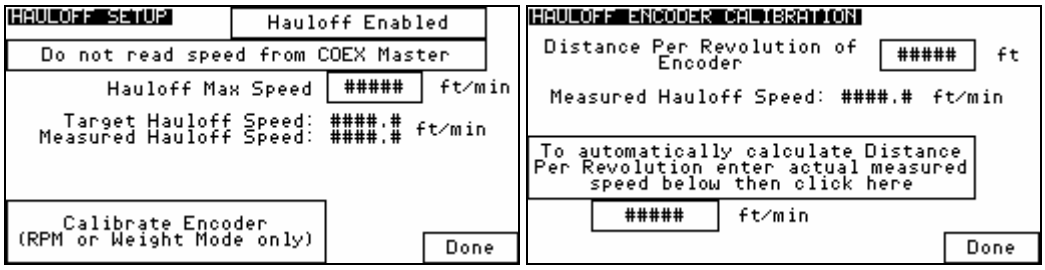
Figure 17: Hopper Setup



Hauloff Setup and Encoder Calibration Page (GH Full Control ONLY)

Use this page to enable the hauloff option of the GH Full Control Unit. The unit should be set to "Do not read speed from COEX Master" if a COEX AB does not exist. If it does then this setting is automatically setup by the COEX Master. The Hauloff max speed must be entered if you are not using an encoder (see mechanical options to turn this feature on/off). If you are using an encoder then you must calibrate the encoder by running the line at a known speed, hand measuring the line speed with a tachometer, entering the speed into the ft/min box, and then clicking the "click here" box. You can also manually modify this calibration by adjusting the "Distance per revolution of encoder".

Figure 17: Hopper Setup and Encoder Calibration Page

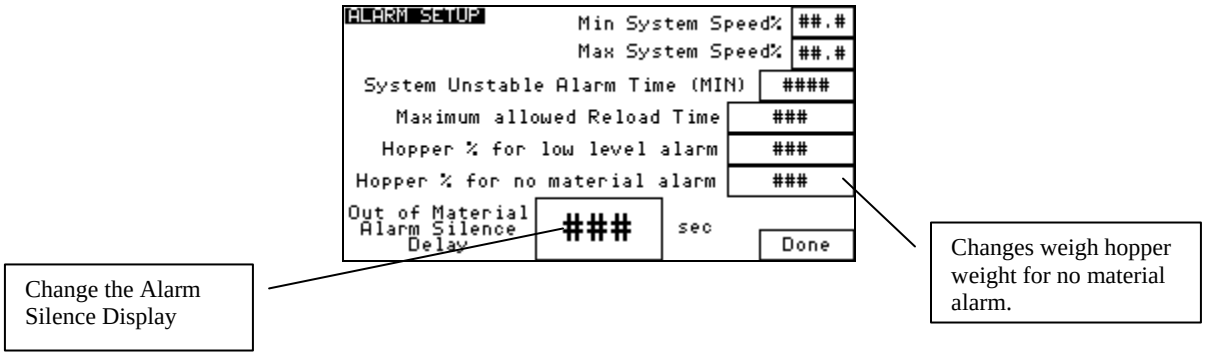

HAULOFF SETUP
Hauloff Enabled
Do not read speed from COEX Master
Hauloff Max Speed ##### ft/min
Target Hauloff Speed: ####.#
Measured Hauloff Speed: ####.# ft/min
Calibrate Encoder (RPM or Weight Mode only)
Done
HAULOFF ENCODER CALIBRATION
Distance Per Revolution of Encoder ##### ft
Measured Hauloff Speed: ####.# ft/min
To automatically calculate Distance Per Revolution enter actual measured speed below then click here
ft/min
Done

Alarm Setup

This screen allows the operator to configure the alarm settings for the rate monitor. To configure the alarms do the following:

6. Enter the Setup Menu.
7. Once in the Setup menu, press “Alarm Setup.” This will take you to the “Alarm Setup” screen.

Figure 18: Alarm Setup Screen



8. Press the “Done” key at the bottom to exit this screen. Min/Max Speed Limits restrict the usable gravimetric range that the GH will permit in order to continue gravimetric measurement. If the system becomes unstable for more than the “System unstable alarm time” then an alarm will notify the operator. The Hopper% for low level should always be set below the reload percentage (hopper setup page) and the Hopper% for no material alarm should always be set below the low level %.

Vacuum Bypass Setup

Enter in the amount of material that is stored above the reload valve. This is only used if you are using the easy change over feature.

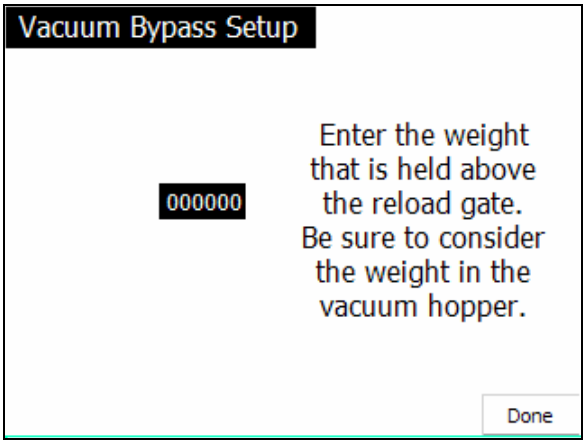
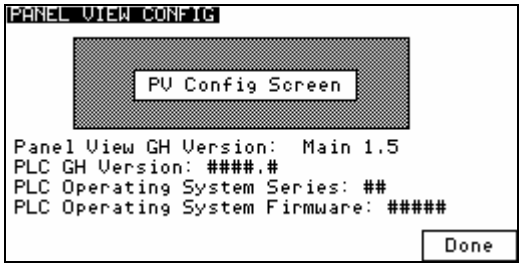

Vacuum Bypass Setup
000000
Enter the weight that is held above the reload gate. Be sure to consider the weight in the vacuum hopper.
Done

Figure 32: PanelView Configuration Screen



3-6 Initial Startup

The system will begin monitoring the process rate once an RPM reading from the Extruder is detected. Again, this RPM must be communicated to the PLC through the supplied inductive proximity switch, or through the Profibus DP Slave module. The extruder icon on the recipe page will become animated, indicating the extruder is running and the measured Extruder RPM will be displayed. If the system does not automatically start loading upon starting of the extruders then check this value for trouble shooting.

At this point, the controller will refill the weigh hopper to its set weight capacity.

The GH-M rate monitor will start tracking the extruder as soon as it is started.

The displayed value may be far from the actual value the first time the system is ran. The GH-M goes through a learning process with each material. This is indicated by a “Steady Process” indicator on the main recipe page. Upon starting the line you should always give the hopper time to analyze the flow and give you a “Steady Process” before making adjustments based on the displayed throughput.

The initial learning process will be complete when the “Steady Process” indicator is displayed on the recipe screen. You are now ready to run the unit as normal. The “Steady” flag indicates that the measured throughput in reliable and can be used for control.

The system will automatically stop loading the hopper upon stopping the extruder. There is no need to manually start/stop a GH-M unit.

Chapter 4: Operation

4-1 Start-up

General Operation

1. As long as the “steady” flag is present, the system will run and monitor your process rate without interaction giving you a continuous real-time measurement.
2. If the extruder is stopped then the GH system will stop automatically.

Quick Start Procedure

Generic

1. Calibrate the weigh hopper before running the system (This will improve inventory and measured throughput accuracy.).
2. Ensure the surge hopper has adequate material to fill the weigh hopper.
3. Verify the extruder’s RPM is being supplied to the controller.
4. Wait for the “Steady Process” indicator to appear and then use the measured extruder throughput for control.

4-2 Operation Procedures

Operator Displays

Figure 33: Typical Operator Screen

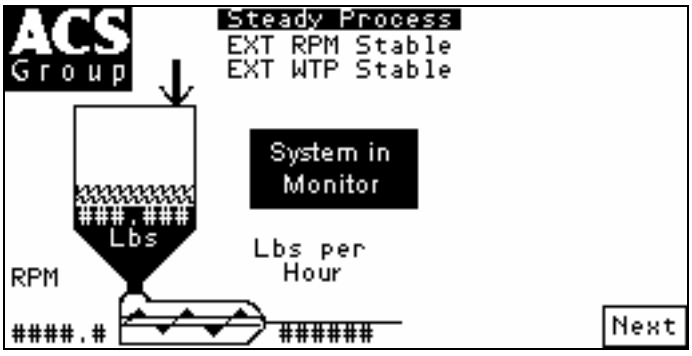
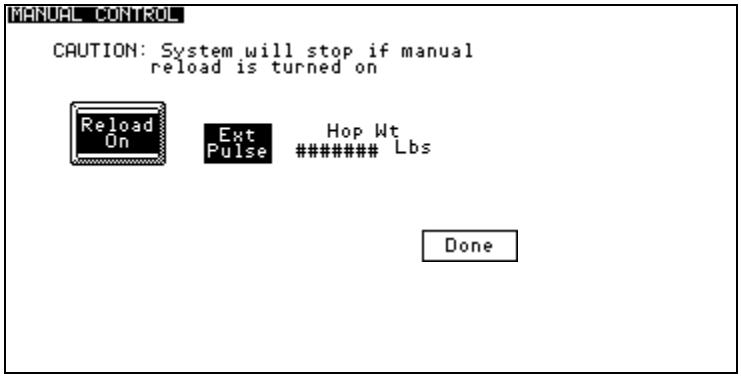


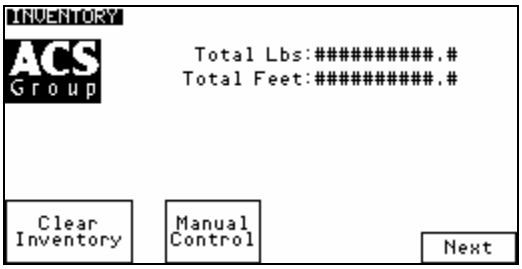
Figure 34: Typical Manual Control Operator Screen



While the rate monitor system is in operation, there are a couple of displays available to the operator. These displays are selected simply by pressing the “NEXT” key when the unit is running. The default display shown when the rate monitor is in run mode is the Recipe Screen.

.

Figure 35: Typical Inventory Display Operator Screen



Alarm Flags

An alarm message will be shown if any alarm condition occurs. A message will pop up on the screen until the alarm condition is resolved. The operator can press "OK" on this pop-up to hide the screen temporarily, but if the alarm condition is still unresolved, then the message will reappear after a short delay. During an alarm condition, a visual alarm will be activated. The following is a list of all alarm names and descriptions:

Alarms with Descriptions

Hopper low level alarm: Hopper is about out of material
Hopper out of material: Hopper is out of material
Inventory cleared: Operator has cleared the inventory (only logged)
Extruder no rpm detected_alarm: ONLY ON GH FULL CONTROL
Extruder no flow detected_alarm: ONLY ON GH FULL CONTROL
Hauloff drive failure alarm: ONLY ON GH FULL CONTROL
Loadcell over max alarm: check loadcell circuit
Reload too long alarm: First indication that you are about to run out of material
System not stable alarm: System has been unstable for too long.
hopper flow over allowed max: System rate is above allowed maximum setting
extruder overspeed: Extruder is out of allowed linear range
extruder underspeed: Extruder is out of allowed linear range
hauloff overspeed: Hauloff is out of allowed linear range (ONLY ON FULL CONTROL)
hauloff underspeed: Hauloff is out of allowed linear range (ONLY ON FULL CONTROL)
feeder overspeed (GHF only): GHF Feeder is running too fast
feeder underspeed (GHF only): GHF Feeder is running too slow
plc battery low: replace battery with power on as soon as possible

Figure 48: Typical Manual Control Operator Screen

The dump valve opens as soon as you touch the "Reload Off" button. The button then changes to show "Reload On".

> **Note: The system will stop if you attempt to turn the manual reload on. This could be devastating if you are running the extruder.**

Print Inventory

The print inventory menu item is used to produce on demand, inventory printouts. Before selecting this item, be sure that the printer is properly connected and ready. This function will generate an inventory.

Chapter 5: Maintenance

5-1 Preventative Maintenance Schedule

The mechanical design of the GH Hopper is very simple and very little maintenance is required. The only moving parts are the metering gates, weigh hopper dump valve, and mixer agitator. The checklist below contains a list of items which should be inspected and/or replaced to keep your GH Hopper operating at peak efficiency. Perform each inspection at the regular intervals listed below.

Figure 52: Sample Preventative Maintenance Schedule

System model #	Serial #

Daily	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By
Inspect hopper for any loose parts- tighten them immediately.													
Verify quality of compressed air supply.													
Inspect weigh hopper for obstructions.													

Every week	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By
Verify the rate monitor is properly calibrated.													
Check to make sure that all hose connections are air tight.													

Every month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Inspect air regulator and air safety circuits, if equipped.												
Recalibrate rate monitor If necessary.												

Photocopy this page for your maintenance records

5-2 Preventative Maintenance

Our GH Hoppers need periodic maintenance to provide long dependable service. Check these elements regularly:

- Check functionality of safety circuit daily.
- Maintain proper air pressure and drain water from trap assembly on regulator – as required.

WARNING! ***Always remove plug and disconnect power before servicing hopper.***

WARNING! ***Always read operating manual before operating or servicing hopper.***

5-3 Corrective Maintenance

Electrical

This section is designed to give the operator an overview of the electrical system that controls the GH Hopper system. Since the hopper's control panel is a self-contained pluggable item, seldom will a maintenance person be required to enter the control panel. For purposes of understanding the system, it is advisable that the maintenance personnel be familiar with not only the internal workings of the control panel, but also with the input and output signals to the GH Hopper.

This section includes the following:

- Internal components of the control panel
- Input signal to the control panel
- Output signals from the control panel

Internal Components of the Control Panel

Note: See Installation Packet supplied with unit for complete electrical schematics.

This section describes the internal components of the GH Hopper system control panel. It is not the intent of this section to completely familiarize the reader with the details on industrial control panel construction or standards, but simply to familiarize the reader with the major components inside the control panel.

The customer must supply 120/1/50 or 60 (or 220/1/50 or 60) via wires L1 & L2 (N). Please insure that the earth ground connection is properly connected to an established earth ground.

- "Power on" is indicated by a lighted on/off switch.
- "Reload" switch controls the vertical reload gate above the hopper.
- "Safety Active" light displays status of safety interlock circuit. Audible alarm horn alerts operator to GH Hopper fault.

Input Signals to Programmable Controller

The rate monitor system has two main input signals that it uses from the extrusion process: the weigh hopper load cell, and the extruder speed reference. This, of course, does not include the operator touch-screen input.

The extruder speed reference is generated from the supplied inductive proximity switch, or is wrote to the PLC through the Profibus DP Slave module.

Load cells require +12 volts DC to operate. This is known as the load cell's excitation voltage.

Output Signals from Programmable Controller

The rate monitoring system uses several output control signals to control the process. All of these are very similar in nature.

The surge hopper refill solenoid is controlled by a PLC output.

Chapter 6: Troubleshooting

6-1 Introduction

The utmost in safety precautions should be observed at all times when working on or around the machine and the electrical components. All normal trouble-shooting must be accomplished with the power off, line fuses removed, and with the machine tagged as out of service.

The use of good quality test equipment cannot be over-emphasized when troubleshooting is indicated. Use a good ammeter that can measure at least twice the AC and DC current that can be encountered for the machine. Be sure that the voltmeter has at least minimum impedance of 5,000 OHMS-per-volt on AC and 20,000 OHMS-per-volt on DC scales. Popular combination meters, VOM and VTVM can be selected to provide the necessary functions.

Before making haphazard substitutions and repairs when defective electrical components are malfunctioning, we recommend that you check the associated circuitry and assemblies for other defective devices. It is common to replace the obviously damaged component without actually locating the real cause of the trouble. Such hasty substitutions will only destroy the new component. Refer to wiring diagrams and schematics.

Locating mechanical problems, should they occur, is relatively straightforward. When necessary, refer to the parts catalog section.

Figure 53: Typical Troubleshooting Problems and Suggested Corrective Actions

Problem	Corrective action
Nothing happens when I start the extruder	Check to make sure that air is hooked up and the regulator gauge reads at precisely 60 PSI.
	Look on the Recipe Screen. If you don't see a displayed Extruder RPM then check the inductive proximity switch. If you do see a displayed RPM then check the hopper's calibration
"Interface has been Locked" is shown	Click "Unlock" and enter in your User Password.
I've forgotten my User Password	Contact the Service Department.
PLC Battery Low	Change out the PLC with your spare and reprogram new unit. Send old PLC back to Manufacturer for repair.

Problem	Corrective action
PLC Module Loaded	Normal after a software upgrade. Follow on-screen instructions.
Weigh hopper occasionally overfills.	Lower the hopper size under “Hopper Setup”

Problem	Corrective action
Recorded Inventory Totals don’t match what I’ve actually used	Check the hopper’s scale calibration and verify that the hopper is not overfilling. If the hopper is overfilling, adjust your hopper size. If this is correct, then you are probably not accounting for material scrap or other items in your process.
Printer did not print	Check that the printer is a SERIAL printer. If not, then you will need to either get a SERIAL printer or purchase a SERIAL to PARALLEL converter.

Problem	Corrective action
The feeder calibration values are moving too much.	Check to ensure that the weigh hopper is not touching any part of the frame and that the loadcell bracket is not touching the plastic cover of the loadcell. If these have been verified then check loadcell and replace if necessary.

Problem	Corrective action
I can’t calibrate the Scale without an error message.	This Is caused by the difference in bits not being large enough. Using the Direct Scale Readout, examine current loadcell bits with and without the calibration weight. If the bits do not change significantly, then check for pellets jamming the loadcells and check the loadcell circuit. You might have a bad loadcell.

Note: Other service problems or questions can be answered by contacting the Service Department.

Chapter 7: Appendix

7-1 Warranty and Spare Parts

Unless otherwise specified, this product includes a Standard ONE YEAR PARTS WARRANTY.

Warranty Specifications

The manufacturer hereby expressly warrants all equipment manufactured by it to be free from defects in workmanship and material when used under recommended conditions, as set forth in the operating manuals for such equipment. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, GUARANTEES, AGREEMENTS, AND SIMILAR OBLIGATIONS OF THE COMPANY AND/OR MANUFACTURER (UNLESS OTHERWISE SPECIFIED IN THE SPECIFIC PRICE PAGE OR LIMITED BY THE MANUFACTURERS' WARRANTY FOR PARTS). The Company's obligation is limited to repair or replace FOB the factory any parts that are returned, prepaid, within one year of equipment shipment to the original purchaser, and which in the Company's opinion, are defective. Any replacement part assumes the unused portion of this warranty.

Warranty Restrictions

This parts warranty does not cover any labor charges for replacement of parts, adjustment repairs, or any other work. This warranty does not apply to any equipment which, in the Company's opinion, has been subjected to misuse, negligence, or operation in excess of recommended limits, including freezing or which has been repaired or altered without the Company's express authorization. If the serial number has been defaced or removed from the component, the warranty on that component is void. Defective parts become the property of the warrantor and are to be returned immediately, without any further use or handling.

Warranty Liabilities

THE COMPANY EXPRESSLY DISCLAIMS ANY AND ALL LIABILITY FOR ANY SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES OR EXPENSES THAT RESULT FROM THE USE OF THIS PRODUCT. Some states do not allow the exclusion or limitation of special, consequential or incidental damages, so the above limitation may not apply to you. The Company's obligation for parts not furnished as components of its manufactured equipment is limited to the warranty of the manufacturers of said parts. The company neither assumes nor authorizes any other persons to assume for it any liability in connection with the sale of its equipment not expressed in this warranty. No person, agent, manufacturer, distributor, dealer, installer or company is authorized to change, modify or extend the terms of this warranty in any manner whatsoever.

The time within which an action must be commenced to enforce any obligation of the Company's arising under this warranty, or under any statute or law of the United States or any state thereof, is hereby limited to the duration of this warranty. Some states do not permit this limitation, so the above may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state. For transactions involving the potential applicability of international law or that of a foreign country, this warranty policy and the procedures hereunder shall be governed by applicable federal and state law, but not by the United Nations Convention on Contracts for the Sale of Goods.

Customer Responsibilities

Any sales, use, or other tax incident to the replacement of parts under this warranty is the responsibility of the purchaser.

Annex B Information

The following design information is provided for your reference:

1. No modifications are allowed to this equipment that could alter the CE compliance
2. Ambient temperature: 40 degrees Celsius – Maximum (104 degrees Fahrenheit)
3. Humidity range: 50% relative humidity
4. Altitude: Sea level
5. Environment: Clean, dust-free and non-explosive
6. Radiation: None
7. Vibration: Minimal, i.e. machine mounting
8. Special installation requirements: Clean, dry compressed air 1 cfm @ 60 psi (1.7 m^3/hr @ 4.14 bar)
9. Allowable voltage fluctuation: +/- 10%
10. Allowable frequency fluctuation: Continuous +/- 1%
    Intermittent +/- 2%
11. Nominal supply voltage: 120/1/60 or 220/1/50/60 (Verify on serial number tag)
12. Earth ground type: TN (system has one point directly earthed through a protective conductor)
13. Power supply should include a neutral power connection.
14. Over-current protection is supplied in the GH Hopper, but additional protection should be supplied by the user.
15. The plug on the power cord serves as the electrical disconnect device.
16. Unit is not equipped with three-phase motors.
17. Functional identification
18. Cable support may be required for power cord, depending on final installation.
19. No one is required to be in the interior of the electrical enclosure during the normal operation of the unit. Only skilled electricians should be inside the enclosure for maintenance.
20. Doors can be opened with a screwdriver, but no keys are required.
21. Two-hand control is not required or provided.
22. All hoppers should be moved around and set in a place with a lift truck or equivalent.
23. There are no frequent repetitive cycles that require manual control—repetitive functions are automatic while the GH Hopper is operating.
24. An inspection report detailing the functional test is included with the GH Hopper.
25. The machine is not equipped with cableless controls.
26. Color-coded (harmonized) power cord is sufficient for proper installation.

Figure 57: Typical Surge Hopper Assembly Parts List

#	DESCRIPTION	010	020	040
1	Lid (Smaller vacuum receivers)	08223-1	872.00769.00	872.00830.00
	Lid (Larger vacuum receivers)	NA	872.00783.00	-
	Lid (Tube Stub for Mezz. Mounted GH Hopper)	08223-2	-	-
2	1/8” NPT fitting	35085K, 35086K		
3	1/4” NPT fitting	35154, 35155		
4	Bulkhead	35146		
5	Brass elbow	35118		
6	24V DC Solenoid	33128		
7	Dump cone	15370	15237	
8	Air cylinder	33126	33073	33011G

Figure 60: Typical Weigh Hopper Assembly Parts List

#	DESCRIPTION	010	020	040
1	WEIGH HOPPER	822.00382.00	822.00383.00	822.00384.00
2	LOAD CELL	61-1010E-10KG	A0564528	A0564546
3	LOAD CELL BRACKET	872.00669.00		

Figure 64: Typical Siemens S7-200 Controller Main Parts List

#	Description	ALL MODELS
1	Siemens S7-200 CPU 226	744.00157.00
2	Siemens EM277 Profibus DP Slave	744.00170.00
3	Siemens TC-EM-231 Analog Module	744.00191.00
4	24V DC Power Supply	A0563932
5	12V DC Power Supply	739.00027.00
6	Alarm Light Yellow Strobe 24V DC	A0565889
7	Glass Fuse – 3.0 amp (115v unit)	A0542207
10	120V Light (power switch)	715.01034.02

Figure 65: Typical Siemens S7-200 Display Main Parts List

#	Description	All MODELS
1	Complete Display Panel (TP177 with Bopla Box)	892.01327.00
2	Siemens TP177 Micro Touch Screen	744.00159.00
3	Display – 8 ft Connection Cable	A0565856
	Display – 50 ft Connection Cable	A0565899

7-2 Addendum (Service Supervisor Information)

Note: Untrained personnel of the rate monitor controller, should not use this section of the manual and/or program can be compromised!

Note: Hidden, programmable features and hidden menu pages should not be made available to floor operators. These pages include the Service Supervisor Information addendum located in this section. Unauthorized changes to these factory settings by inexperienced operators may prevent the unit from operating properly, and may void part or all of the warranty.

Caution! ***After all selections are made: Keep pressing the "Done" key until the unit returns to the Recipe menu.***

Note: Inexperienced operators or inexperienced plant personnel should not access programmable features. Unauthorized changes may prevent the rate monitor from operating properly and may void part or all of the warranty.

Note: Call the Service Department for assistance or for further explanation of these or any other programmable features, which may or may not be shown in this manual.

Note: Information included in this manual is subject to change without notice.

Passwords

- User Password "5413"
- Maintenance Password "3145348"

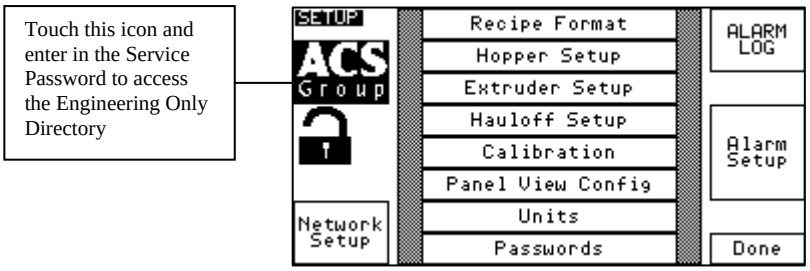
Caution! ***Maintenance password should only be supplied to qualified personnel! The program can be compromised.***

Programmable Settings

The rate monitor software program has been designed to allow some customizing to achieve certain desired operating parameters. The following is a listing of the selections that are "field" programmable, followed by the procedure for doing so.

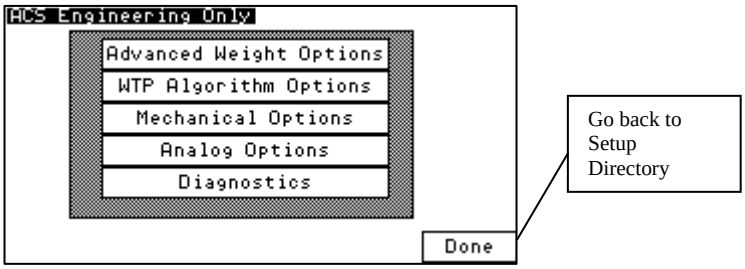
Pressing the manufacturer's icon when in the "Setup" Directory Screen menu accesses this menu.

Figure 67: Typical Operator Setup Screen



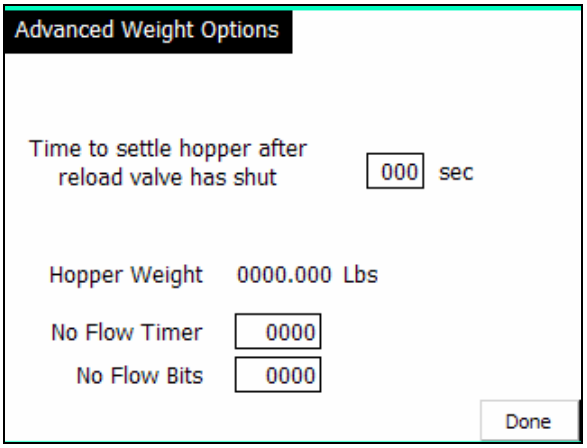
Enter the long password “3145348” and press “Enter”. The factory setup section displays the “Engineering Only” screen. The screen similar to that shown below should be displayed and use the keystrokes described herein to change or toggle the parameters.

Figure 68: Typical Engineering Only Setup Screen



Select the desired menu to advance to the screens listed below. The exit to the “Setup” screen select “Done”

Figure 69: Typical Advanced Weight Options Screen

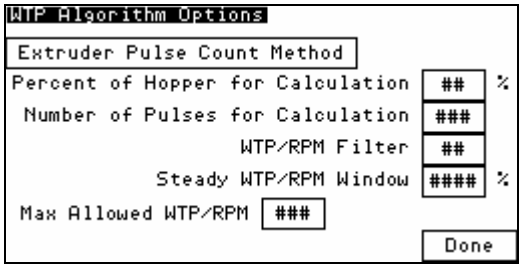


Advanced Weight Options Screen

*Increase the “Time to settle hopper after reload valve has shut” if the hopper needs more time to settle after reloading

*Increase “No flow timer” and decrease “No flow bits” to reduce nuisance “no flow” alarms. Set to “0” will disable this alarm.

Figure 70: Typical WTP Alogorithm Options



WTP Algorithm Options Screen

The method that is used to calculate the measured lbs/hr is entirely adjustable to fit any application. The three methods that can be used is “Extruder Pulse Count Method”, “Percent of Hopper Method”, or “Full hopper Method”. You cannot use the “Extruder Pulse Count Method” if you are writing the extruder speed through communications instead of using our inductive proximity switch.

Extruder Pulse Count Method

This method updates the weight every “Number of Pulses for Calculation” detected by the extruder proximity switch. This is not the most automated method of the 3 choices, but has it’s advantages. If you are using an unusually large extruder and running it in production at a very low speed then this method works best because the snapshot is taken at the same rotational position of the extruder and eliminates errors in measurement that are caused by the pulsing of the feed throat.

Percent of hopper Method (DEFAULT)

This is the most automated and responsive of the 3 choices. The snapshot sample is based on the “Percent of Hopper for Calculation” setting. The smaller you make this setting the quicker the hopper will update. If this value is set too small then you will be measuring the instantaneous throughput of the feed throat instead of the average loss-in-weight. The average consumption at the feed throat always equals what is coming out at the die. However, the instantaneous feed throat usage is not equal to the usage at the die. This is due to the pressure barrier sections and design of your extruder. The goal of the GH system is to accurately control and measure what is coming out the die and not to respond to nuance changes at the feed throat. It is not recommended that you reduce this setting unless consulting engineering or service and you fully understand this feature.

Full Hopper Method

This is the most stable of all 3 choices. Upon reloading a weight snapshot and time are used to calculate the overall usage since the last reload. This is also the least responsive setting.

WTP/RPM Filter

When switching between the 3 methods you need to understand the sample time and configure the “WTP/RPM Filter” appropriately. A good example of this is that by default the hopper is configured to reload at 50% (keeps material in the vertical section of the hopper), sample in “Percent of Hopper Method” at 20%, and uses a filter of “9”. If it is desired to switch to the “Full Hopper Method” then you don’t need a filter of “9”. A filter of “9” uses 10 points. At a sample of “20%” you get 2 samples per reload. It would therefore take 5 reloads to fill the analyzer upon starting the line. After that the measurement will be updated with each and every 20%. When switching to the “Full Hopper Method” you only need a filter of “4” to achieve the same time frame of samples, but the response will be much dampened to any oscillation or error in measurement. If using the “Extruder Pulse Count Method” then you must do the math to determine what sample time frame you need.

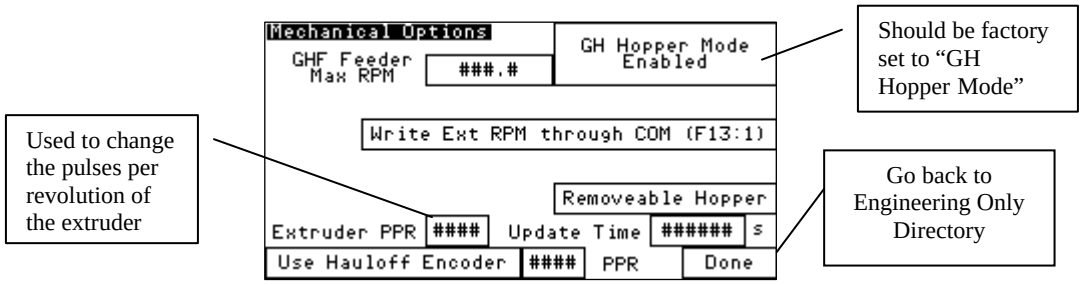
Steady WTP/RPM Window

No matter which method you chose the analyzer compares the series of measurements to the "Steady WTP/RPM Window" percent to determine if the measurements are stable. If this is set too small the system might never give you a "Steady Process" indication. If set too big then the system could respond to nuance changes in the loadcell and cause an erratic response in your control system. When set properly the weigh hopper can be hit with a hammer (not recommended) and it will not cause any error in the displayed measurement. Another more common procedure would be if an operator intermittently adds a processing agent to the extruder by dumping it directly into the weigh hopper. This will not cause any error due to the measurement algorithm that was previously mentioned.

Max Allowed WTP/RPM

If a lbs/hr per RPM value is every calculated above this setting then the GH will ignore the sample. This is to prevent an operator from draining a hopper while running and causing an erroneous, but consistent measurement. The flow through an open drain tube is very consistent and would cause the extruder to respond by speeding up unless this value is setup. By default this is disabled and must be configured by a knowledgeable service person. After running for some time you can go to the WTP/RPM Calibration page and observe the average WTP/RPM factor. You can then set this value above that by 200-300 % to eliminate the error caused by draining the hopper while running.

Figure 71: Typical Mechanical Options Screen



Mechanical Options Screen

For a GH-M rate monitor, the "GH Hopper Mode" should always be enabled. This option should be factory set for a rate monitor. The option exists because this software is used for other products.

The mechanical options screen also allows the user to set the method of obtaining the extruder's RPM. This setting should also be factory set.

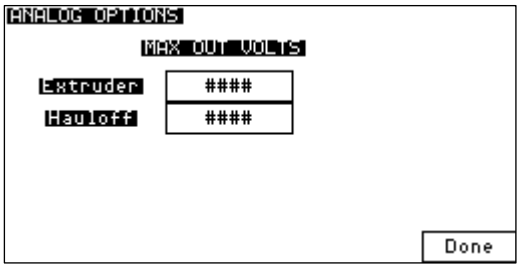
If writing the extruder RPM through Profibus then the unit should be set to "Write Ext RPM through COM (F13:1).

If the extruder's RPM is being measured with the supplied proximity switch the unit should be set to "Measure Ext RPM with Prox". If the mechanical device to measure the extruder's speed presents more than one pulse per revolution, this value may be changed on the "Mechanical Options" page also. Simply input the number of pulses per revolution in the "Extruder PPR" field.

The hauloff encoder setting is not functional for the rate monitor controller.

The “GHF feeder max RPM” setting is not functional for the rate monitor controller.

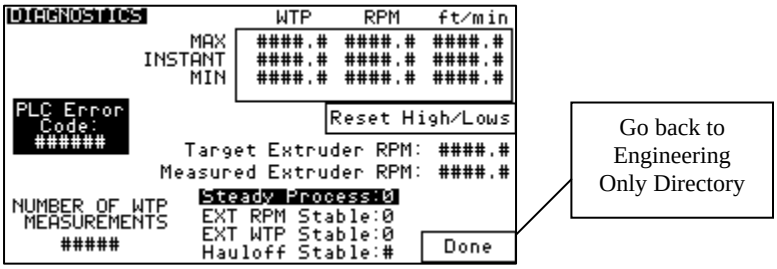
Figure 72: Typical Analog Options



Analog options screen

This screen is not used with the GH-M Rate Monitor. Adjust appropriately for GH Full Control units.

Figure 73: Typical Diagnostics Screen



Diagnostics Screen

Use this screen for trouble shooting and making tuning adjustments. Typically make an adjustment, reset high/lows, and then weight for some time to observe this page.

Customer Setup Menu

Units

This screen allows the user to change the GH Hopper's unit of measurement. The entire GH Hopper can be configured in either Kgs. or Lbs., while the Target vs. Actual data can be configured for either regardless of the GH Hopper's units.

7-3 Siemens S7-200 Communications Manual

The Siemens GH Hopper uses a S7-200 CPU 226 processor communicating acting as a DP Slave using a EM277 Siemens Profibus module. The node address is configured via 2 dials on the front of the module that is located in the PLC rack. The GSD file requires the user to specify where in memory the top of the input data block is located (area where the master will write to us). This address if V1300 and should be added to the GSD file before being downloaded.

EXPLANATION OF INPUT ANNOTATION:
I – 16BIT UNSIGNED INTEGER
I(D) -32BIT UNSIGNED INTEGER
I(F) -32BIT IEEE FLOAT
I,BIT X –SINGLE BIT VALUE

EXPLANATION OF OUTPUT ANNOTATION:
O – 16BIT UNSIGNED INTEGER
O(D) -32BIT UNSIGNED INTEGER
O(F) -32BIT IEEE FLOAT
O,BIT X –SINGLE BIT VALUE

The Profibus interface module has 32 words (1-32) in the input block and 32 words (1-32) in the output block. Starting at word "1".

ALL BIT REFERENCES IN THIS MANUAL REFER TO THE BIT ORDER OF A 16-BIT SIEMENS WORD. SIEMENS USES BIG ENDIAN/LITTLE ENDIAN PRINCIPLES AND THEREFORE THE FIRST BYTE IS ACTUALLY THE MOST SIGNIFICANT BYTE. BIT 0 OF THE FIRST WORD REFERS TO THE LEAST SIGNIFICANT BIT. THIS BIT IS STORED AT THE START OF THE SECOND BYTE OF THE WORD. IF VW1300 WAS THE 16-BIT WORD BEING ADDRESSED, THEN BIT 0 OF THIS WORD WOULD ACTUALY BE V1301.0 AND NOT V1300.0. SINCE ALL PROFIBUS DATA IS IN WORDS WE REFER TO THIS STANDARD FORMAT THROUGHOUT THE MANUAL.

Below are the items that can be accessed for the hopper:

7-4 ITEMS IN BLUE ARE READ ONLY! ITEMS IN BLACK ARE WRITE ONLY!

Chapter 8:

Chapter 9: Item

GENERAL HOPPER INFO
1. hopper_weight_percent,O23 (0-1150), easy to use scale to show weight
2. total_weight_minus_tare O(F) 24, this is the material weight
3. reload_output, O1,BIT 4, to show reloading

HOPPER MODE STATUS
1. ramp_to_stop_engaged,O1,BIT 0
2. monitor_mode_engaged, O1,BIT 1
3. control_by_rpm_engaged, O1,BIT 2
4. control_by_weight_engaged, O1,BIT 3
5. alarm active, O32, BIT 0
6. system heart beat, O32, BIT 1

HOPPER MODE CONTROL
1. ramp_to_stop_pushed,I1,BIT 0 (toggle this bit to stop line)
2. monitor_mode_pushed, I1,BIT 1 (toggle this bit to put in monitor mode)
3. control_by_rpm_mode_pushed, I1,BIT 2 (toggle this bit to put unit in rpm mode)
4. control_by_weight_mode_pushed, I1,BIT 3 (toggle this bit to put unit in weight mode)

HOPPER ALARMS
1. hopper_low_level_alarm,O2,BIT 0
2. hopper_out_of_material_alarm, O2,BIT 1
3. hopper_over_filling_alarm, O2,BIT 2
4. extruder_no_rpm_detected_alarm, O2,BIT 4
5. extruder_no_flow_detected_alarm, O2,BIT 5
6. hauloff_drive_failure_alarm, O2,BIT 6
7. loadcell_over_max_alarm, O2,BIT 7
8. reload_too_long_alarm, O2,BIT 8
9. alarm active, O32, BIT 0

INVENTORY INFO
1. clear_inventory, I1,BIT 4 (toggle this to clear all inventory, you must also reset this bit after completion)
2. hopper_inventory,O(F) 3
3. hauloff_accumalated_length,O(F) 5

EXTRUDER SETPOINT INFO
1. entered_extruder_rpm_target, I(F) 2 (write desired rpm here)
2. extruder_rpm_target, O(F) 7
3. extruder_rpm_instant, I(F) 4 (write rpm value here if you are not using the extruder prox signal for the calculation)
4. actual_extruder_rpm_instant,O(F) 9

HAULOFF SETPOINT INFO
1. entered_hauloff_speed_target,I(F) 6 (write desired line speed here)
2. hauloff_speed_target,O(F) 11 (TARGET GENERATED BY SYSTEM)

3. current_measured_hauloff_speed,O(F) 13 (ACTUAL MEASURED)

RECIPE SETPOINT INFO

1. entered_recipe_target,I(F) 8 (write desired recipe entry here such as lbs/hr,lbs/ft,lbs/ft^2)
2. recipe_running_target,O(F) 15 (running target based on hopper mode)
3. recipe actual value,O (F) 17 (compare this to target for accuracy)
4. ext_wtp_target,O(F) 19 (lbs/hr or kgs/hr depending if the system is in imperial or metric)
5. ext_wtp_average,O(F) 21 (lbs/hr or kgs/hr depending if the system is in imperial or metric)
6. layflat,I(F) 10
7. change entered extruder rpm target, I1,BIT 5 (toggle to load entered extruder rpm target, you must also reset this bit after completion)
8. change entered hauloff speed, I1,BIT 6 (toggle to load entered hauloff speed, you must also reset this bit after completion)
9. change entered recipe target, I1,BIT 7 (toggle to load entered recipe target, you must also reset this bit after completion)
10. change layflat, I1,BIT 8 (toggle to load layflat value, you must also reset this bit after completion)

STEADY FLAGS

1. system_stable, O1,BIT 5
2. extruder_rpm_stable, O1,BIT 6
3. extruder_wtp_stable, O1,BIT 7
4. hauloff_stable, O1,BIT 8

DESIRED SHUTDOWN TIME (WRITE A “0” TO DISABLE)

1. desired shutdown time in minutes,I(F) 12

WRITING SETPOINTS EXPLANATION

Extruder RPM set points, recipe set points, and haul-off set points can be wrote to while the unit is in stop mode. After engaging either RPM mode or Weight mode then the appropriate values will be applied. While in RPM mode the target recipe value will be overwrote by what the current actual running value is. This ensures that when you transfer to “Weight Mode” that the line set points do not change. This acts as a virtual cruise control for your line. Bring the extruder and haul-off up to the desired outputs and then place the unit in “Weight Mode” to maintain the ratio even as the screen pack builds up material over time.

The Extruder RPM set points and haul-off set points can be modified while in RPM mode and the unit will respond immediately.

The Recipe set point can be modified while in Weight mode. Some recipe set points may include the extruder RPM or the haul-off speed depending on the recipe mode selection. If the recipe mode selection is lbs/ft and the second entry is set to extruder rpm input then the target lbs/ft and the extruder rpm is set by the operator while the PLC calculates the target feet/min needed to achieve the desired recipe.

No set points can be modified while in “Monitor Mode”. The PLC will take constant snap shots of the extruder RPM, haul-off speed, and recipe set points and will write these to ensure a “bump-less” transfer when entering into either RPM Mode or Weight Mode.

The system can be placed in “RPM Mode”, or “Monitor Mode” from stop at any time. The system can go from “RPM Mode”, “Weight Mode”, or “Monitor Mode” into stop mode at any time as well. However, there are restrictions when transferring between other modes. The system must be stable before it will allow you to transfer from “RPM Mode” into “Weight Mode”. Also the system must be stable when transferring from “Monitor Mode” to “RPM Mode”. If you are in “Monitor Mode” you must transfer into “RPM Mode” and then stabilize before going into “Weight Mode”.

SHUTDOWN SEQUENCE EXPLANATION

The hopper has the ability to shutdown the loading system prior to the line shutting off to eliminate material in the supply hopper. If you write any non-zero value to “ desired shutdown time in minutes” then the GH will calculate based on the current process rate, recipe, and preset (at the touch screen) “supply weight” (amount of material that the supply hopper will store) when it should disable each vacuum conveyer for each individual hopper. If the GH runs out of material prior to it’s expecting time then it is up to the operator to reset the “desired shutdown time in minutes” to allow it to convey and continue loading. An example would be an hour before the operator wants to shutdown they would enter in the shutdown time of 60 minutes into a touch screen cell on your master controller. Your controller would then write a value of 60 to the “desired shutdown time in minutes” and would write to us the process rate. The blender would use this process rate and other items to determine when it should disable the loaders. Based on that data the blender decides to disable the loading for GH five minutes before the countdown time of the original 60 minutes has passed. However at 2 minutes prior to the original countdown time hopper 1 runs out of material and alarms “Hop Out of Material”. The operator at that time can either shutdown the line 2 minutes early or can change the value of “60” to “0” and the system will reload the GH again. At that time the operator can enter a value of “2” minutes and the system will disable the loaders for the last 2 minutes of the run. This feature will require tuning and practice on the part of the operator to achieve the correct shutdown sequence, but if done properly will save the operator time and work in having to empty out full supply hoppers.

GH INPUT BLOCK (WRITE HERE)

PLC WORD ADDRESS	PLC BYTE ADDRESS	WORD	TYPE	DESCRIPTION
V1300	V1301.0	1	INT	bit 0= ramp to stop pushed
	V1301.1			bit 1= monitor mode pushed
	V1301.2			bit 2= rpm mode pushed
	V1301.3			bit 3= control by weight mode pushed
	V1301.4			bit 4= clear inventory
	V1301.5			bit 5= change entered extruder RPM target
	V1301.6			bit 6= change entered hauloff speed
	V1301.7			bit 7=change entered recipe target
	V1300.0			bit 8=change layflat
V1302		2	FLOAT	entered extruder RPM target MSW
V1304		3		entered extruder RPM target LSW
V1306		4	FLOAT	extruder RPM instant MSW
V1308		5		extruder RPM instant LSW
V1310		6	FLOAT	entered hauloff speed MSW
V1312		7		entered hauloff speed LSW
V1314		8	FLOAT	entered recipe target MSW
V1316		9		entered recipe target LSW
V1318		10	FLOAT	layflat MSW
V1320		11		layflat LSW
V1322		12	INT	desired shutdown time in minutes
V1324		13		not used
V1326		14		not used
V1328		15		not used
V1330		16		not used
V1332		17		not used
V1334		18		not used
V1336		19		not used
V1338		20		not used
V1340		21		not used
V1342		22		not used
V1344		23		not used
V1346		24		not used
V1348		25		not used
V1350		26		not used
V1352		27		not used
V1354		28		not used
V1356		29		not used
V1358		30		not used
V1360		31		not used
V1362		32		not used

GH OUTPUT BLOCK READ HERE)

PLC WORD ADDRESS	PLC BYTE ADDRESS	WORD	TYPE	DESCRIPTION
V1364	V1365.0	1	INT	bit 0= ramp to stop engaged
	V1365.1			bit 1= monitor mode engaged
	V1365.2			bit 2= control by rpm mode engaged
	V1365.3			bit 3= control by weight mode engaged
	V1365.4			bit 4= reload output on
	V1365.5			bit 5= system stable flag
	V1365.6			bit 6= extruder rpm stable flag
	V1365.7			bit 7= extruder throughput stable flag
	V1364.0			bit 8= hauloff stable flag
V1366	V1367.0	2	INT	bit 0= hopper low level alarm
	V1367.1			bit 1= hopper out of material alarm
	V1367.2			bit 2= hopper over filling alarm
	V1367.3			bit 3= not used
	V1367.4			bit 4= no extruder rpm detected alarm
	V1367.5			bit 5= no extruder flow detected alarm
	V1367.6			bit 6= hauloff drive failure alarm
	V1367.7			bit 7= loadcell over max alarm
	V1366.0			bit 8= reload too long alarm
V1368		3	FLOAT	hopper inventory MSW
V1370		4		hopper inventory LSW
V1372		5	FLOAT	hauloff accumalated length MSW
V1374		6		hauloff accumalated length LSW
V1376		7	FLOAT	extruder RPM target MSW
V1378		8		extruder RPM target LSW
V1380		9	FLOAT	actual extruder RPM instant MSW
V1382		10		actual extruder RPM instant LSW
V1384		11	FLOAT	hauloff speed target MSW
V1386		12		hauloff speed target LSW
V1388		13	FLOAT	current measured hauloff speed MSW
V1390		14		current measured hauloff speed LSW
V1392		15	FLOAT	recipe running target MSW
V1394		16		recipe running target LSW
V1396		17	FLOAT	recipe actual value MSW
V1398		18		recipe actual value LSW
V1400		19	FLOAT	extruder WTP Target MSW
V1402		20		extruder WTP Target LSW
V1404		21	FLOAT	extruder WTP average MSW
V1406		22		extruder WTP average LSW
V1408		23	INT	Hopper percent weight (0-1150)
V1410		24	FLOAT	Total weight minus tare (material weight) MSW
V1412		25		Total weight minus tare (material weight) LSW
V1414		26		not used
V1416		27		not used

V1418		28		not used
V1420		29		not used
V1422		30		not used
V1424		31		
V1426	V1427.0	32	INT	bit 0=alarm active
	V1427.1			bit1=heart beat (alternates every .5 second)

Parts Department

Call Spare Parts Express toll-free 8am-8pm EST (800) 423-31839 or Phone: (847) 273-7700; Fax (847) 273-7812.

OEM quality replacement and spare parts ensure operation at design specifications. Please have the model and serial number of your equipment when you call. Consult the Customer Parts List included in your information packet for replacement part numbers.

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Call toll free (800) 423-3183 8am-8pm EST – Emergency service available 24 hours a day. We have a qualified service department ready to help. Service contracts are available for most of our products.

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